

Master Gardeners' ORGANIC HORTICULTURE Presentation 2010



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SOME OF THE BASICS

Seven Organic Rules

1. Always use the best adapted varieties for each environment.
2. Plant in the preferred season.
3. Balance the mineral content of the soil.
4. Build and maintain the soil organic content – humus.
5. Do nothing to harm the beneficial soil life.
6. Consider troublesome insects and diseases as symptoms of one of the above rules having been violated.
7. Be patient. Mother Nature gives birth, but Father Time controls the cycles
- **from *Lessons in Nature* by Malcolm Beck**

Caring For The Soil As A Living System

Three Aspects of Soil Health & Fertility

- Physical
- Chemical – Organic Chemistry: cations – anions
- Biological

Requirements of a Living System

- Food
- Air
- Water
- “Shelter” – Soil structure & Conservation
- Living Organism - Biota

1. 95% of Pest and Disease Control is attributable to plant health.
2. 99%+ of Plant Health is dependent on healthy soil.
3. 100% of Soil Health is dependent on good organic content and biological diversity.
4. 100% of Soil Health problems are due to chemicals, pesticides and other man-made interference.

Basic BioIntensive IPM

Host Resistance

The ability of a plant or animal to resist an attack by a pest

Cultural

Altering the environment, the condition of the host plant or animal or the behavior of the pest to prevent or suppress an infection. This is during the growth period of a plant.

Mechanical

Removal of a pest from the host through the use of physical controls, traps, devices, and other objects.

Biological

Use of natural enemies, parasites, predators, and pathogens.

Chemical – Plant & Organic

To destroy pests, control their activities or prevent them from causing damage. Materials based on plant extracts and microbial antagonists.



Instructions: Build a Compost Bin

Find a Location for the Pile

Your pile can be built anywhere except up against a structure such as a house or fence. Macroorganisms, i.e., bugs, etc., will assist you in the composting process. You want them in the pile, not in the house. Also, I've read that compost can rot some types of wood, although I would imagine that the moisture and organisms in a pile have a greater effect than the compost itself.

The following list will give you a number of points to consider in locating your pile. The more of them you meet, the better off you are. Remember that your pile can be moved at any time, so you don't have to get it right the first time.

- At least 2 feet away from a structure such as a fence or house
- Easy access for you
- Close to source of materials, i.e., leaves, grass clippings
- Easy access to a source of water for wetting down the pile
- Level surface
- Well-drained surface
- Pavement or earth underneath are OK (on pavement, the nutrients can't leach out into the ground; on ground, earthworms will come to help decompose your pile)
- Near, but at least 2 feet away from, a wall or tree to break the wind (which could dry out your pile)
- Not so near a pine tree that it would catch a lot of needles (pine needles are high in carbon and will slow down the composting process)
- Shade if you live in a very dry, hot climate (to keep pile from drying out in intense sun)
- Away from vegetable gardens (slugs and other critters may like your compost pile)

Set up a Compost Bin (Optional)

[Alternatives](#)

A bin is unnecessary. You can just build your pile on the ground. However, bins are useful for keeping your pile looking neat, retaining heat and moisture, and avoiding the negative effects of wind and weather. If you live in a rural area

where food wastes are composted in your pile, a bin can help deter pests. If space is a problem, a bin can be helpful in containing your pile within a confined area.

If you want to use a bin, you may build one or buy one. If saving time is your highest priority, buy one. If saving money is your highest priority, build one -- it is not difficult. Refer to the following links to assist you:

- [Instructions for Building a Compost Bin](#). Materials which can be used to build a compost bin are almost limitless. Some are hogwire, cinder blocks, bales of hay, wooden pallets, and lumber.
- [Types of Compost Bins Available from Vendors](#). The thing I like the best about ready-made bins is that if you are already dragging your feet in your efforts to start composting, you can take a "giant step" by getting a ready-made bin. The bin I use came in two parts. The first piece was the four sides of the bin already connected, but folded. The second part was an aeration tube for the middle of the pile with a plastic cap on it. I just unfolded the bin (2 seconds) and put the plastic cap on the aeration tube (18 seconds). In just 20 seconds I went from thinking about starting a home compost bin to having one in operation.

Think Before You Build

Before you buy or build, review the [list of factors to consider](#):

Factors to Consider

The best thing to do when choosing your bin is to walk through the Step-by-Step Instructions, imagining how you would do each step with the bin you are considering. Whether you are buying or building, you should consider the following factors:

- **Size.** The pile should be at least 1 cubic yard (3 feet wide x 3 feet deep x 3 feet high). This is large enough to retain heat and moisture, but small enough to remain aerated in the center as long as the pile is frequently turned. Do not build a bin larger than 5 feet wide x 5 feet high x any length. This size would be too large to remain aerated in a home compost operation.
- **Easy access to add materials.** You need to make sure that the method for adding materials is appropriate for the composting you will do. For instance, if there is a plastic lid that is difficult to remove and/or attach, that might be OK for someone who was going to compost infrequently in batches because they wouldn't have to deal with it very often. However, if you are using the "add as you go" method, it could be quite frustrating and may discourage composting.

Larry Wilhelm of the Earthworks organization has an interesting setup. He places some of his compost bins under a group of rabbit hutches. This allows the rabbits to add manure to his pile on a regular basis without additional effort from him. To

move the manure throughout the pile, he keeps chickens in the compost bin who distribute the manure by scratching (and also provide manure of their own). Of course, the chickens also eat some of the pile's decomposers -- no system is perfect, but this one is close!

- Easy access to remove finished compost. I once saw a commercial bin that required that you turn the bin onto its side and remove the bottom to access the finished compost. If you are composting in batches, but don't intend to turn your pile, this might not be a problem. At the end of the composting process, the compost would take up only 25 - 40% of the original weight of the pile. However, if you "add as you go", you would have to turn over a sizable container loaded with material and, therefore, quite heavy. Also, when you opened the bottom, partially decomposed materials may fall out along with the finished compost.

I heard of one woman who built a compost bin out of a discarded rabbit hutch. She set it up on cinder blocks at each corner and placed a metal tray underneath the bin and between the blocks. As compost was created at the bottom of the pile (there wasn't a lot of turning going on here), the compost fell through the 1/2" wire mesh to the tray below. She just slid the tray out to access her compost, then returned the tray to its location. Great idea!

- Ability to turn pile. Some commercial bins have a handle to turn the entire bin without having to handle the product. Ask if the vendor has a demo bin FULL of materials you can test. Make sure the full bin is not too heavy for you to turn.

If there is no handle, think about how you would turn the pile by (1) stirring with a pitchfork or (2) restacking the pile. The side of the bin will be 3 to 4 feet tall, so it is best if there is a way to remove one side so you can get at it easily.

- Appearance. If you are going to place the bin where you or your neighbors will see it, you need to make sure its appearance is not objectionable.
- Creature access. If you live in an area where composting food scraps is acceptable (does not include most suburban or urban areas), make sure that your pile cannot be accessed by whatever local wildlife is present -- from rodents to bears!

Decide whether you need one bin, two, or three. This depends on the amount of room you have, how you use them, and the amount of convenience you require. I use three: one for composting, one for storing leaves that I collect in fall, and one for slow-composters like twigs and holly leaves. **Some people have a 3-bin system so they can turn the pile into the adjacent bin, then build another pile in the first bin** (sort of a musical chairs for compost).



If you require 3 bins, it doesn't matter whether you get three one-bin systems or one three-bin system. Also, as long as you can build a cubic yard pile which

allows the flow of air and water, **one bin will not compost significantly faster than another.**

If you've chosen to build a bin, read through this page, including links, to get an idea of what you are working toward. Think about materials which you are getting ready to discard or for which you don't have another use. **Rather than go out and buy new materials for making a bin, use something you already have.** Modify the instructions below to fit the materials you have or can cheaply obtain.

Remember that a material such as 16-gauge plastic-coated wire mesh, hogwire or hardware cloth will wear better than chicken wire, which can easily stretch out of shape. In addition, wood materials are organic and will eventually compost and have to be replaced. It is best not to use pressure-treated lumber as there has been some indication that the arsenic present in the wood will leach into your compost. Treated wood also has toxic levels of copper and chromium.

Bins have been made out of such diverse materials as:

- spoiled bales of hay
- wooden pallets
- aluminum above-ground swimming pool walls
- discarded rabbit hutch
- old bricks or cinder blocks
- snow fencing
-

Take all safety precautions. Use eye and ear protection when building your bin.

Simple, Cheap Construction



Personally, my favorite bin is a ready-made C.E. Shepherd bin. But my **SECOND** most favorite bin is made of 4 wooden pallets set on end, tied together into a box with plastic ties. **Most places, pallets are readily available free of charge from warehouses, warehouse stores, grocery or hardware stores.** To make a one-bin system into a two-bin system, just get three more pallets and some plastic ties. The only drawback is that, after a year or two, your bin will have begun to compost along with your other carbons.

Use and Application of Compost

Compost can be used to amend soil for lawns, gardens, ornamental plants, trees, and potted plants. The following application frequency and amounts are given as guidelines. Use your judgment and monitor your vegetation to determine the best rates for your environment. Application guidelines are given for the following areas:

- Amend Soil with Finished Compost
 - Amend Soil with Organic Materials
 - Mulch with Organic Materials
 - Apply Worm Castings
-

Amend Soil with Finished Compost

Lawn

On established lawns, apply compost once a year in layers 1/4 to 1/2 inch thick. Water well.

To prepare soil for a new lawn, till 4 inches of compost into 6 inches of soil.

Trees and Shrubs

Lay 1" compost around trees from one foot away from trunk out past the drip line. A 2" layer should be used for shrubs. Apply once per year.

To prepare soil for new shrubs, till the soil to a depth of 8 - 10 inches. The depth should be at least twice the width of the root ball. Apply a layer of 4 inches of compost and mix thoroughly into soil. If soil is very poor use 6 inches of compost instead.

Garden

Lay 1/2 to 1" compost on top of soil. If possible, till 2 - 4" into the top 10" soil. In large fields, apply between 900 and 1200 lbs. per acre as needed, depending on the current health of the soil.

To establish a new garden or prepare garden for planting, till the soil to a depth of 8 - 10 inches. Apply a layer of 4 inches of compost and mix thoroughly into soil. If soil is very poor use 6 inches of compost instead, mixing much of the additional compost into the top 3 - 4" of soil.

Potted Plants

Do not plant in pure compost. To root properly, plants must have the texture provided by soil. Your potting mix may be 1/4 to 1/3 compost. The remainder may be good potting soil. Many organic gardening books have "recipes" for potting soil which recommend a combination of compost, castings, potting soil, and other organic materials.

Amend Soil with Organic Materials

This section covers soil amendment by addition of organic materials that are not yet fully composted. Such materials should not be added into soil which contains living plants -- see the discussion on nitrogen draft in the next section. Organic materials may be added directly into the ground and allowed to compost there if the ground will remain fallow for an appropriate time -- at least 6 months. For instance, organic materials may be tilled into a garden after the fall harvest and left fallow at least 6 months until spring planting. Because the appropriate mass is not achieved, composting in the ground takes longer than composting in a pile. To prepare for a new lawn or garden, till 2 inches of compost into the top 6 inches of soil. Be sure to cover the ground with several inches of mulch.

Mulch with Organic Materials

Mulch is matter that is placed on top of the ground (NOT tilled into the ground) as a covering. All bare soil should have a cover of mulch. Although some like to mulch for the appearance, the real purpose of mulch is to protect the health of the soil. Mulch lessens the effect of extreme temperatures. During summer months bare soil may reach 120 degrees F, but if that same soil were mulched, it would reach about 85 degrees F. In addition, mulch increases moisture retention, prevents top soil from washing away, and reduces soil compaction. One of the great benefits of mulch is that it shades out weeds. By covering the ground, weeds cannot get enough light to grow. The few that do survive are so weak, they can be easily removed. Before you lay down mulch, cover the ground first with newspaper. This will make it even harder for weeds to grow. In addition to partially completed compost, there are many other organic materials which may be used as mulch: pine needles, various types of wood bark or chips, pecan or peanut shells, and shredded leaves.

Partially Completed Compost, Nitrogen Draft and the Forest Floor

There is controversy as to whether partially completed compost should be used as mulch. Opinions range from

"Never use compost that is not completely finished. After compost is finished, let it cure for several weeks to be sure the process is complete."

to

"One of the best mulches is partially decomposed compost."

Proponents against this practice claim that the compost will rob soil and existing plants to obtain nitrogen needed to complete composting. Other concerns are that there may be pathogens in the bacteria that have not yet been killed by exposure to the hot center of the pile, and that acids in the materials may be released as they compost and harm plant roots. Most experts agree that nitrogen will be stolen for composting if the materials are tilled INTO THE GROUND. The debate is whether or not this is true if the matter is laid on top of the soil. Other experts, including Howard Garrett (Texas Organic Gardening, p. 98) say that, as long as the partially decomposed matter stays on top of the soil, there is no damaging nitrogen draft.

For my own use, I believe it is good mulch. I base this decision on the forest floor. The forest floor, from the bottom layer up, consists of soil, finished compost, partially finished compost, barely-started compost, and fresh organic materials. If it is OK for nature, it is OK for me. You must decide for yourself on this issue.

Trees

Place compost around trees or shrubs from one foot from trunk, extending out past the drip line. Don't place mulch right up against trunk. Recommendations as to the depth of mulch vary from 2 - 6 inches. I usually try to get it about 4 inches deep when I lay it down once a year. When I mulch the next year, I put the new mulch on top of the previous year's mulch, which is in the process of decomposing. An added benefit to mulching around trees is that the ground does not get compacted, nor the tree trunk damaged from mowing and weed-eating.

Annuals and Perennials

Partially completed compost can make mulch for ornamental plants. Recommendations range from 1/2 to 3 inches over entire bed. Don't place mulch right up against plants.

Garden

Partially completed compost can make mulch for food crops. Apply 1/2 to 1 inch over entire bed. Don't place mulch right up against plants.

Excellent Compost Materials:

"BROWNIES"

(Carbon)

Hay

Leaves

Straw

Nutshells

Shredded paper

Pine needles

Saw dust

Garden stalks

60%

"GREENIES"

(Nitrogen)

Coffee Grounds

Cover Crops

Seaweed

Vegetable scraps

Egg shells

Fruit

Weeds

Grass clippings

40%



Cheap and Easy Worm Bin!

Composting with redworms is great for apartment dwellers who don't have yard space, or for those who don't want to hike to a backyard compost bin with their food scraps. Some kids like to keep worms for pets! By letting worms eat your food wastes, you'll end up with one of the best soil amendments available—worm castings. This is the cheapest and easiest to manage worm bin system that I've seen:

Materials Needed to Make an Easy Harvester Worm Bin:

- Two 8-10 gallon plastic storage boxes (dark, not see through!) as shown in pictures Cost: about \$5 each
- Drill (with 1/4" and 1/16" bits) for making drainage & ventilation holes
- Newspaper
- About one pound of redworms



Step 1 Drill about twenty evenly spaced 1/4 inch holes in the bottom of each bin. These holes will provide drainage and allow the worms to crawl into the second bin when you are ready to harvest the castings.

Step 2 Drill ventilation holes about 1

– 1 ½ inches apart on each side of the bin near the top edge using the 1/16 inch bit. Also drill about 30 small holes in the top of **one** of the lids.





Step 3

Prepare bedding for the worms by shredding Newspaper into 1 inch strips. Worms need bedding that is moist but not soggy. Moisten the newspaper by soaking it in water and then squeezing out the excess water. Cover the bottom of the bin with 3-4 inches of moist newspaper, fluffed up. If you have any old leaves or leaf litter that can be added also. Throw in a handful of dirt for "grit" to help the worms digest their food.



Step 4

Add your worms to the bedding. One way to gather redworms, is to put out a large piece of wet cardboard on your lawn or garden at night. The redworms live in the top 3 inches of organic material, and like to come up and feast on the wet cardboard! Lift up cardboard to gather the redworms. An earthworm can consume about 1/2 of its weight each day. For example, if your food waste averages 1/2 lb. per day, you will need 1 lb. of worms or a 2:1 ratio. There are roughly 500 worms in one pound. If you start out with less than one pound, don't worry they multiply very quickly. Just adjust the amount that you feed them for your worm population.

Step 5

Cut a piece of cardboard to fit over the bedding, and get it wet. Then cover the bedding with the cardboard. (Worms love cardboard, and it breaks down within months.)



Step 6

Place your bin in a well-ventilated area such as a laundry room, garage, balcony, under the kitchen sink, or outside in the shade. Place the bin on top of blocks or bricks or upside down plastic containers to allow for drainage. You can use the lid of the second bin as a tray to catch any moisture that may drain from the bin. This "worm tea" is a great liquid fertilizer.



Step 7

Feed your worms slowly at first. As the worms multiply, you can begin to add more food. Gently bury the food in a different section of the bin each week, under the cardboard. The worms will follow the food scraps around the bin. Burying the food scraps will help to keep fruit flies away.

What do worms like to eat? Feed your worms a vegetarian diet. Most things that would normally go down the garbage disposal can go into your worm bin (see the list below). You will notice that some foods will be eaten faster than others. Worms have their preferences just like us.

Feeding your worms:

Worms LOVE	Worms HATE
Breads & Grains	Dairy Products
Cereal	Fats
Coffee grounds & filter	Meat
Fruits	Feces
Tea bags	Oils
Vegetables	

When the first bin is full and there are no recognizable food scraps, place new bedding material in the second bin and place the bin directly on the compost surface of the first bin. Bury your food scraps to the bedding of the second bin. In one to two months, most of the worms will have moved to the second bin in search of food. Now the first bin will contain (almost) worm free vermicompost. (You can gently lift out any worms that might remain, and place them in the new bin, or put them into your garden!)

Troubleshooting

Problem	Probable Cause	Solution
Worms are dying or trying to escape	Too wet Too dry Bedding is used up	Add more bedding Moisten bedding Harvest your bin
Bin stinks!	Not enough air Too much food Too wet	Drill more ventilation holes Do not feed for 1-2 weeks Add more bedding
Fruit Flies	Exposed food	Bury food in bedding

Application of Worm Castings

Earthworm castings are even richer in nutrients than compost, so they must be used more sparingly. Castings are rich in bacteria, calcium, iron, magnesium, and sulphur and 60 other trace minerals. N-P-K is about 1-.1-.1 according to one source.

Lawn

Apply castings once per year at 20 lbs. per 1000 square feet.

Annuals and Perennials

Put a small handful of castings into each hole as you plant. Four times a year, apply castings at a rate of 10 lbs. / 1000 square feet -- OR -- once per year at 20 lbs. per 1000 square feet.

When preparing beds, mix 6 inches of compost into the soil, then mix in castings at the rate of 20 pounds per 1000 square feet.

Garden

When germinating seed, place in bottom part of soil. At transplanting time, put a small handful of castings into each hole as you plant. This is also true for bulbs, vegetables, herbs.

Potted Plants

Mix a small amount of earthworm castings to your potting soil. Remember that castings are very potent, so don't overdo it. No more than one-fifth of the ingredients should be castings.

Brewing Compost Tea

Tap your compost pile to make a potion that is both fertilizer and disease prevention

by Elaine R. Ingham

Gardeners all know compost is terrific stuff. But there's something even better than plain old compost, and that's compost tea. As the name implies, compost tea is made by steeping compost in water. It's used as either a foliar spray or a soil drench, depending on where your plant has problems.

Why go to the extra trouble of brewing, straining, and spraying a tea rather than just working compost into the soil? There are several reasons. First, compost tea makes the benefits of compost go farther. What's more, when sprayed on the leaves, compost tea helps suppress foliar diseases, increases the amount of nutrients available to the plant, and speeds the breakdown of toxins. Using compost tea has even been shown to increase the nutritional quality and improve the flavor of vegetables. If you've been applying compost to your soil only in the traditional way, you're missing out on a whole host of benefits



Start with good compost, give it some water, some aeration, and some time, and you'll have a multipurpose elixir for your garden.

The science behind compost tea

The soil is full of microorganisms that aid plant growth and plant health--bacteria and fungi, which are decomposers, and protozoa and beneficial nematodes, which are predators. But there are bad guys, too--disease-causing bacteria and fungi, protozoa, and root-feeding nematodes. Our goal as gardeners is to enhance the beneficial microorganisms in this soil foodweb, because they help our plants.

It's not coffee -- it's tea. brewed compost tea is a rich microorganism that are the organisms beneficial to your plants' growth and health: growth and

The bad bacterial decomposers and the plant-toxic products they make are enhanced by anaerobic, or reduced-oxygen, conditions. By making sure the tea and the compost itself are well oxygenated and highly aerobic, you eliminate 75 percent of the potential plant-disease-causing bacteria and plant-toxic products. To take care of the other 25 percent of potential diseases and pests, you want to get good guys into the soil and on at least 60 to 70 percent of your plants' leaves. Good bacteria work against the detrimental ones in four ways: They consume the bad guys, they may produce antibiotics that inhibit them, they compete for nutrients, and they compete for space.

Plants themselves don't use all of the energy they make through photosynthesis. For example, 60 percent of a vegetable plant's energy goes to its root system, and half of that energy is exuded into the soil. Of those exudates, 90 percent are sugars; the rest are carbohydrates and proteins. When you think about these ingredients as food, they're the makings for cake. This is high-energy stuff. Why is nearly one-third of a vegetable plant's output going into the soil as energy-rich food? To feed the good bacteria and fungi.

When we human beings kill off bacteria, fungi, protozoa, nematodes, and other organisms, whether by polluting the air or by spraying pesticides or even by using chemical fertilizers, we're reducing the population of critters that plants feed. That's why one of the simplest and best things you can do for your garden is to spray your plants with compost tea, to bring back organisms killed by chemicals.

Brewing and using the tea

Once you have fully mature, nice-smelling compost, it's time to brew tea. You will need a 5-gallon plastic bucket and a few aquarium supplies: a pump large enough to run three bubblers (also called air stones), several feet of air tubing, a gang valve (which distributes the air coming from the pump to the tubes going to the bubblers), and three bubblers. You'll also need a stick for stirring the mixture, some unsulfured molasses (preferably organic), and an old pillowcase, tea towel, or nylon stocking for straining the tea. An extra bucket comes in handy for decanting the tea. Don't try to make compost tea without the aeration equipment. If the tea is not aerated constantly, the organisms in it will quickly use up the oxygen, and the tea will start to stink and become anaerobic.



To brew compost tea, you'll need a pump, some air tubing, a gang valve, and three bubblers.

An anaerobic tea can harm your plants. Also, keep in mind that tea made using this bucket method needs to brew for two or three days and then be used immediately. If you work Monday through Friday, start the tea on Wednesday or Thursday, so it will be ready in time to apply it on the weekend.

If you're on a well, you can use water straight from the spigot. But if you're using city water, run

the bubblers in it for about an hour first, to blow off any chlorine. Otherwise, the chlorine will kill all those beneficial organisms you've gone to the trouble of raising.

Tea time

Once you have safe water, fill the empty bucket half full of compost. Don't pack it in; the bubblers need loose compost to aerate properly. Cut a length of tubing and attach one end to the pump and the other to the gang valve. Cut three more lengths of tubing long enough to reach comfortably from the rim to the bottom of the bucket. Connect each one to a port on the gang valve and push a bubbler into the other end.

Hang the gang valve on the lip of the bucket and bury the bubblers at the bottom, under the compost. Fill the bucket to within 3 inches of the rim with water, and start the pump.

When it's going, add 1 oz. of molasses, then stir vigorously with the stick. The molasses feeds the bacteria and gets the beneficial species growing really well. After stirring, you'll need to rearrange the bubblers so they're on the bottom and well spaced. Try to stir the tea at least a few times a day. A vigorous mixing with the stick shakes more organisms loose and into the tea. Every time you stir, be sure to reposition the bubblers.

After three days, turn off the pump and remove the equipment. If you leave the tea aerating longer than three days, you must add more molasses or the good organisms will start going to sleep because they don't have enough food to stay active. Let the brew sit until the compost is pretty much settled out, 10 to 20 minutes, then strain it into the other bucket or directly into your sprayer. You'll have about 2 1/2 gallons of tea. If you want, this is the time to add foliar micronutrients, like kelp or rock dust. Use the tea right away, within the hour if possible.

You can put the solids back on the compost pile or add them to the soil. There are plenty of good bacterial and fungal foods left in them.

Follow your nose

With any form of compost, solid or tea, bad smells mean bad business. Healthy, adequately oxygenated compost and compost tea should smell sweet and earthy. Never use a smelly compost tea on your plants. The true bugaboo is alcohol, a product of anaerobic decomposition that destroys cell walls. Roots tolerate only 1 part per million alcohol. That's a very small amount, and human noses aren't good at detecting it. Instead, we can detect all the other smelly compounds that go with anaerobic production of alcohol.

If your compost tea smells bad, add a second pump with more bubblers, and stir it more often. Aerate it until the smell goes away. Likewise, if your compost pile smells bad, turn it more frequently.

Using the tea

How often to spray your plants with tea depends on how healthy your garden is. In my garden, which has had no pesticide use since 1986, I spray my plants one time in spring, then let the beneficial insects spread the compost tea organisms around the plants in my garden, preventing any pest problems for the rest of the season.

Beneficial insect presence is a good indicator of your garden's health. If you don't have good levels of beneficial insects in your garden, then spray at least once a month, or as often as

once every two weeks. Start when plants have developed their first set of true leaves.

To control damping-off, spray the soil with full-strength tea as soon as you plant. On trees and shrubs, spray two weeks before bud break, then every 10 to 14 days. You'll have to spray every 10 days if you have a neighbor who sprays pesticides, because pesticides kill the beneficial organisms as well as some of the pests.

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Photos: Ruth Lively

Tea-brewing setup in six steps



1. Attach one end of a piece of tubing to the pump; the other end will connect to the gang valve.



2. Attach tubing to each of the three ports on the gang valve. Plug bubblers into the other ends.



3. For adequate aeration, be sure the bubblers sit on the bottom of the bucket, which is half filled with compost.



4. Add water to within a couple of inches of the rim. If you're using city water, aerate it first for an hour to get rid of any chlorine.



5. To feed the microorganisms, add an ounce of unsulfured molasses (organic is best) to the bucket and stir.



6. Stir vigorously a few times daily to shake free as many organisms as possible and to increase aeration. Reposition the bubblers after stirring so they're well spaced.

Cover Crops

<u>Plant</u>	<u>Main Benefit</u>
Winter Rye	OM, W, NR, E, SS
Winter Wheat	OM, E, W, NR
Perennial ryegrass	E, OM, W, NR
Sudan Grass	OM, SS, W, E, NR
Buckwheat	W, B, P, OM
Hairy vetch	N, B, OM, W, P, E
Common Vetch	N, B, OM, P, E
Crimson clover	OM, N, B, P
Red clover	N, OM, P, SS, B, W
Alfalfa	N, SS, OM, P, E, B
Soybeans	N, OM, B

B – Harbors beneficial insects

E – Holds soil against erosion

N – Fixes Nitrogen

NR – Takes up and conserves soluble nitrogen

OM – Add organic matter

P – Make phosphorus and other nutrients more available

SS – Opens subsoil breaks hardpan

W – Suppresses weeds

Plants that attract lacewings:

<i>Achillea filipendulina</i> - Fern-leaf yarrow	<i>Coriandrum sativum</i> - Coriander
<i>Anethum graveolens</i> - Dill	<i>Cosmos bipinnatus</i> - Cosmos white sensation
<i>Angelica gigas</i> - Angelica	<i>Daucus Carota</i> - Queen Anne's lace
<i>Anthemis tinctoria</i> - Golden marguerite	<i>Foeniculum vulgare</i> - Fennel
<i>Atriplex canescens</i> - Four-wing saltbush	<i>Helianthus maximilianii</i> - Prairie sunflower
<i>Callirhoe involucrata</i> - Purple poppy mallow	<i>Tanacetum vulgare</i> - Tansy
<i>Carum Carvi</i> - Caraway	<i>Taraxacum officinale</i> - Dandelion

Plants that attract ladybugs:

<i>Achillea filipendulina</i> - Fern-leaf yarrow	<i>Foeniculum vulgare</i> - Fennel
<i>Achillea millefolium</i> - Common yarrow	<i>Helianthus maximilianii</i> - Prairie sunflower
<i>Ajuga reptans</i> - Carpet bugleweed	<i>Penstemon strictus</i> - Rocky Mt. penstemon
<i>Alyssum saxatilis</i> - Basket of Gold	<i>Potentilla recta 'warrenii'</i> - Sulfur cinquefoil
<i>Anethum graveolens</i> - Dill	<i>Potentilla villosa</i> - Alpine cinquefoil
<i>Anthemis tinctoria</i> - Golden marguerite	<i>Tagetes tenuifolia</i> Marigold - lemon gem
<i>Asclepias tuberosa</i> - Butterfly weed	<i>Tanacetum vulgare</i> - Tansy
<i>Atriplex canescens</i> - Four-wing saltbush	<i>Taraxacum officinale</i> - Dandelion
<i>Coriandrum sativum</i> - Coriander	<i>Veronica spicata</i> - Spike speedwell
<i>Daucus Carota</i> - Queen Anne's lace	<i>Vicia villosa</i> - Hairy vetch
<i>Fagopyrum esculentum</i> - Buckwheat	

Plants that attract Tachinid Flies, Hoverflies Minute Pirate Bugs and Parasitic Mini-Wasps:

<i>Allium tanguticum</i> - Lavender globe lily	<i>Lobelia erinus</i> - Edging lobelia
<i>Alyssum saxatilis</i> - Basket of Gold	<i>Melissa officinalis</i> - Lemon balm
<i>Aster alpinus</i> - Dwarf alpine aster	<i>Mentha pulegium</i> - Pennyroyal
<i>Astrantia major</i> - Masterwort	<i>Mentha spicata</i> - Spearmint
<i>Callirhoe involucrata</i> - Purple poppy mallow	<i>Petroselinum crispum</i> - Parsley
<i>Chrysanthemum parthenium</i> - Feverfew	<i>Potentilla recta 'warrenii'</i> - Sulfur cinquefoil
<i>Lavandula angustifolia</i> - English lavender	<i>Rudbeckia fulgida</i> - Gloriosa daisy
	<i>Sedum kamtschaticum</i> - Orange stonecrop
	<i>Sedum spurium & album</i> - Stonecrops
	<i>Thymus serpyllum coccineus</i> - Crimson thyme
	<i>Zinnia elegans</i> – Zinnia (liliput)

Organic Horticulture Presentation

RESOURCES

BOOKS:

Healthy Soil (Best of Fine Gardening)

Publisher: Taunton Press; (September 1995)

ISBN: 1561581011

Soil Biology Primer

Published by Soil and Water Conservation Society

In cooperation with USDA Natural Resources Conservation Service

www.swcs.org

800-THE-SOIL

Worms Eat My Garbage: How to Set Up & Maintain a Worm Composting System by Mary Appelhof, Mary F. Fenton (Illustrator)

Publisher: Flower Press; Revised edition November 1, 1997)

ISBN: 0942256107

Lessons in Nature (Paperback)

by [Malcolm Beck](#)

Product Details: Paperback: 330 pages; **Publisher:** Acres U.S.A.; 4th edition (November 1, 2005); **ISBN:** 0911311807

Teaming with Microbes: A Gardener's Guide to the Soil Food Web (Hardcover)

by [Jeff Lowenfels](#), [Wayne Lewis](#)

Product Details: Hardcover: 196 pages; **Publisher:** Timber Press; Reprint edition (July 15, 2006); **ISBN:** 0881927775

Insects and Gardens: In Pursuit of a Garden Ecology (Paperback)

by [Eric Grissell](#)

Product Details: Paperback: 345 pages; **Publisher:** Timber Press (February 1, 2006); **ISBN:** 0881927686

The Rodale Book of Composting: Easy Methods for Every Gardener (Paperback) by [Grace Gershuny](#) (Editor), [Deborah L. Martin](#) (Editor)

Product Details: Paperback: 278 pages; **Publisher:** Rodale Books; Revised edition (January 15, 1992); **ISBN:** 0878579915

Silent Spring [SPECIAL EDITION] (Paperback)

by [Rachel Carson](#)

Product Details: Paperback: 400 pages; **Publisher:** Mariner Books; 40th Anniversary edition (October 22, 2002); **ISBN:** 0618249060

WEB SITES:

<http://www.ext.vt.edu/>

<http://attra.ncat.org/>

<http://www.vmga.net/>

<http://www.nnmastergardeners.com/>

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<http://www.acmewormfarm.com/index.html>

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<http://www.beyondpesticides.org/>

<http://www.organicgardening.com/>

<http://www.woodsend.org/>

<http://www.intlctc.org/>

<http://www.simplici-tea.com/>

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<http://www.growingsolutions.com/>

<http://www.soilfoodweb.com/phpweb/>
